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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

DEC 18 1974

OFFICE OF  
RESEARCH AND DEVELOPMENT

MEMORANDUM FOR RAY PARDON  
Office of Soviet Union Affairs  
Department of State

SUBJECT: Protocol of the Second meeting of the Clean Fuels Subgroup  
of the US/USSR Stationary Source Air Pollution Control  
Technology Working Group

The enclosed subject Protocol is being transmitted to you for your  
information. The agreement is the result of the Clean Fuels Task Force  
meeting of the US/USSR Stationary Source Air Pollution Control Technology  
Working Group.

Margaret J. Stasikowski  
Technical Assistant  
Air Pollution Control Division

Enclosure

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PROTOCOL

of the Second meeting of the Clean Fuels  
Subgroup of the US/USSR Stationary Source  
Air Pollution Control Technology Working  
Group.

In accordance with the protocols of the second meeting of the US/USSR Working Group on Stationary Source Air Pollution Control Technology signed in Washington, D. C. on April 25, 1974, and the protocol of the Particulate Abatement Technology and Process Modification and Improvement subgroups signed in Moscow on October 25, 1974, meetings were held in the USA between the US and USSR delegations during December 1-13, 1974.

The U. S. delegation was headed by Mr. T. K. Janes, Chief of the Fuel Process Section, Control Systems Laboratory, U. S. Environmental Protection Agency. The USSR delegation was headed by Mr. V. M. Maslennikov, Laboratory Chief, Institute of High Temperature, USSR Academy of Sciences. Participants of these discussions are listed in Appendix 1.

The Soviet side was accorded an opportunity to visit several U. S. organizations working in the areas of Pollution Control of the environment by processes such as fuel gasification, liquefaction, fuel gas cleaning, oil demetallization, coal preparation, and advance systems for generating electrical energy from coal and oil. The Soviet delegation consisted of representatives from the USSR Academy of Sciences, USSR Ministry of Petroleum Refining Industry and USSR Ministry of Coal Industry. The air pollution impact and control technology topics under discussion were related to:

- A-7 Demetallization Pretreatment for Hydrodesulfurization of Heavy Residual Oils
- { B-5 Gasification of Coal and Oil and Cleaning of Fuel Gases for Power Generation
- ✓ B-6 Production of Liquid Fuels from Coal and Mixtures of Coal-Oil
- B-7 Improvement of Equipment and Technology for Coal Enrichment
- B-10 Development of Common Methodology for Comparing the Economics of Various Processes for Hydrodesulfurization of Heavy Petroleum Stock
- B-11 Power generation plant with combined cycle based on gasification of Coal and O.I
- B-12 Gas Cleaning Systems for Coal and Oil Gasification Systems
- B-13 Design and Operations of Industrial Coal and Oil Combined Cycle Plants.

A list of facilities visited is attached in Appendix 2.

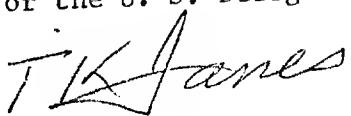
The detailed schedule and work plan for project A-7 identified in the 2nd protocol for the "Demetallization Pretreatment for Hydrodesulfurization of Heavy Residual Oils to Produce Low Sulfur, Low Ash Fuel Oils" were finalized during this meeting. Included in this discussion, would be methods to improve desulfurization of residual oil. The details are given in Appendix 3. After successful completion of the Project, as outlined in the work plan, both sides agreed to discuss prior to the end of 1975 the possibility of additional programs in this area.

The B category projects B-7, B-10, B-11, B-12, and B-13 were reviewed, modified and finalized for submission to the work group for approval. The details of the modified projects are shown in Appendix 4. The technologies covered under Projects B-5 and B-6 were discussed and the following was agreed. Both sides agreed that the technology covered in B-5 and B-6, gasification of coal and mixtures of coal and oil could not be discussed in detail. Additionally both sides recognized that other US/USSR groups are interested in these areas. However, it is also recognized that each group would be stressing different aspects of the technology. Details of these projects are shown in Appendix 5. The U. S. side expressed an interest in cooperation in the areas of identification and control of environmental impact from oil shale processing and slurry combustion. The U. S. side additionally felt that the situation is quite similar to the above situation on coal gasification and liquification and recommends a similar approach. Both sides recommend that each coordinate with the various groups and interested factors on status of work and agreed to the necessity of having a meeting of experts prior to the next working group meeting to further develop possibilities for cooperation in these areas. The subgroup recommends these topics be discussed at the next working group meeting in 1975. Both sides agree that to increase the fruitfulness of the cooperation, at the conclusion of each meeting unresolved questions will be formulated and program outlined that would develop the necessary information for discussion at the next meeting.

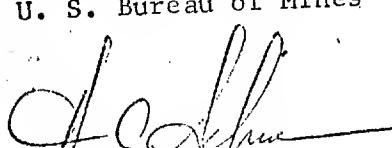
Both sides noted the meetings were conducted in the spirit of friendship, mutual understanding and cooperation.

The protocol was signed on December 13, 1974, in Washington, D. C., in Russian and English, both texts being equally authentic.

For the U. S. Delegation



MR. T. K. JANES  
Head of the U.S. Delegation  
in the Working Group  
Chief, Fuel Process Section  
U. S. Environmental Protection  
Agency

  
MR. A. W. DEURBROUCK  
Research Supervisor  
U. S. Bureau of Mines  
MR. F. A. SCHORA  
Vice President, Institute of  
Gas Technology

For the U.S.S.R. Delegation



MR. V. M. MASLENNIKOV  
Head of the USSR Delegation  
in the Working Group  
Laboratory Chief of IVT of  
the USSR Academy of Sciences

  
MR. N. S. YEGOROV  
Deputy Director of IOTT, USSR  
Ministry of Coal Industries  
MR. YU. K. VAYL  
Senior Research Worker of  
VNIINP, USSR Ministry of  
Petroleum Chemistry and  
Petroleum Refining Industries

APPENDIX 1

Delegates and experts, participants of the 4th working meetings of the US/USSR subgroup on subjects of Clean Fuels

U. S. S. R.

MR. V. M. MASLENNIKOV

Laboratory Chief of IVT of the Academy of Sciences

MR. N. S. YEGOROV

Deputy Director of IOTT of the Ministry of Coal Industries

MR. Y. U. K. VAYL

Senior Researcher of VNIINP of the Ministry of Petroleum Industries

U. S. A.

MR. T. K. JANES

Chief, Fuel Process Section, U. S. Environmental Protection Agency

MR. A. W. DEURBROUCK

Research Supervisor Pittsburgh Research Center, U. S. Bureau of Mines

MR. FRANK SCHORA

Vice President, Institute of Gas Technology

DR. DAVID ARCHER

Manager of Chemical Engineering, Westinghouse Research Laboratories

DR. FRED ROBSON

Chief, Utility Power System, United Aircraft Research Laboratories

DR. R. A. MEYERS

Manager of Coal Desulfurization, TRW Systems and Energy

MR. G. R. SMITHSON

Manager, Environmental Programs, Battelle Columbus Laboratories

DR. CLARENCE JOHNSON

Senior Vice President, Hydrocarbon Research, Inc.

MR. W. J. RHODES

Project Engineer, U. S. Environmental Protection Agency

Appendix 1 - Cont'd

MR. JAMES KILGROE

Project Engineer, U. S. Environmental Agency

MR. LLOYD LORENZI

Project Engineer, U. S. Environmental Agency

MR. J. NOTARY

Vice President  
Heyl and Patterson

MR. J. DRAPER

Superintendent, Warwick Preparation Plant

MR. E. CARROL

Drevo Corporation

MR. R. BUZONAS

Superintendent, Banning Preparation Plant

MR. E. SARAPUKA

Scientist, Illinois Geological Survey

DR. KAMM

President, Oklahoma State University

DR. B. L. CRYNESS

Professor of Chemical Engineering  
Oklahoma State University

DR. H. J. ALLISON

Professor of Electrical Engineering  
Oklahoma State University

DR. R. J. SCHOEPPEL

Professor of Mechanical Engineering  
Oklahoma State University

Mrs. Catherine Guilsher - Interpreter

Mr. Vladimir Storojen - Interpreter

Appendix 2

Facilities Visited by the USSR Delegation

1. Westinghouse Research Laboratories, Pittsburgh, Pennsylvania
2. Bituminous Coal Research, Inc., Monroeville, Pennsylvania
3. U. S. Bureau of Mines, Morgantown, Pennsylvania
4. U. S. Bureau of Mines, Briceton, Pennsylvania
5. Hydrocarbon Research, Inc., Trenton, New Jersey
6. Heyl and Patterson, Pittsburgh, Pennsylvania
7. Duquensne Light Co., Warwick Coal Preparation Plant, Greensboro, Pennsylvania
8. Republic Steel Company, Banning No. 4 Coal Preparation Plant, Van Meter, Pennsylvania
9. Institute of Gas Technology, Chicago, Illinois
10. UOP, Des Plaines, Illinois
11. Oklahoma State University, Stillwater, Oklahoma
12. City Service Refinery, Lake Charles, Louisiana
13. EPA, Waterside Mall, Washington, D. C.

Appendix 3

Project A-7: Demetallization Pretreatment for Hydrodesulfurization of Heavy Residual Oils to Produce Low Sulfur, Low Ash Fuel Oils

At the meeting, tests and schedules have been discussed for Project A-7. Both sides have agreed that two types of demetallization runs will be conducted. The first type is called screening tests and the second type is called long duration runs. The tests to be performed in the United States are shown in Table 1. The tests to be performed in the USSR are shown in Table 2. Also shown are other pertinent data. The conditions are shown in Table 3.

The main purpose of the screening tests is to determine if results already available in each Country can be reasonably well reproduced in the other Country. This will indicate that differences in test equipment, procedures, and other undefined differences do or do not affect the results. Additionally, these tests provide a relatively inexpensive and timely way of evaluating materials, test and analytical procedures, test conditions, etc., that are unfamiliar to each side. These tests will also provide some background data for use in subsequent long duration tests.

The long duration tests are designed to provide sufficient demetallization data on catalyst and oils so that each Country will have a good knowledge of the state-of-the-art in the other Country and the relative advantages and disadvantages of each test combination. The length of the tests was selected with this in mind. Also, the test duration will produce sufficient demetallized feed to allow subsequent desulfurization tests of 20 to 25 days, if the data demetallization is satisfactory.

The test run conditions were selected on the basis of each Country's experience with the respective oils. If during screening tests or long duration tests either Country finds that these conditions are unsatisfactory, they will notify the other Country of the situation and an attempt to arrive at more acceptable test conditions will be made.

Upon completion of the screening tests, the results will be exchanged and, if no problems were encountered, only a minimum of data review time will be utilized. After the review, the long duration runs will be initiated. The target test schedules are shown in Table 4 with the actual starting date being mainly determined by receipt of all necessary materials.

For each run that is conducted a series of analyses will be performed as shown in Table 5 and demetallized product samples exchanged. All materials to be exchanged are shown in Tables 6 and 7.

After completion of these tests and exchange of data, a final report, that is co-authored by both sides will be prepared. This report will describe the work and results of these investigations.

Either during or after the long duration tests further communications regarding additional tests will be entered into.

Table 1  
Demetallization Tests in the United States

I. Screening tests - 100 to 150 hours duration

<u>Run No.</u>	<u>Catalyst</u>	<u>Oil</u>
1	U.S.S.R. (2% $\text{MoO}_3$ )	U.S.S.R. atmospheric resid

II. Long Duration Tests - 500 hours duration

<u>Run No.</u>	<u>Catalyst</u>	<u>Oil</u>
1	U.S.S.R. (2% $\text{MoO}_3$ )	U.S.S.R. atmospheric resid
2	"	U.S.S.R. vacuum resid
3	"	U.S.A. vacuum resid (Tia Juana)
4	U.S.A. (1% Mo)	U.S.S.R. atmospheric resid
5	"	U.S.S.R. vacuum resid

Table 2  
Demetallization Tests in the U.S.S.R.

I. Screening Tests - 100 to 150 hours duration

<u>Run No.</u>	<u>Catalyst</u>	<u>Oil</u>
1	U.S.A. (1% Mo)	U.S.A. vacuum resid (Tia Juana)
2	"	U.S.A. vacuum resid (Gach Saran)

II. Long Duration Tests - 500 hours duration

<u>Run No.</u>	<u>Catalyst</u>	<u>Oil</u>
1	U.S.A. (1% Mo)	U.S.A. vacuum resid (Tia Juana)
2	"	U.S.S.R. vacuum resid
3	U.S.S.R. (2% $\text{MoO}_3$ )	U.S.A. vacuum resid (Tia Juana)
4	U.S.A. (0% Mo)	U.S.S.R. atmospheric resid
5	U.S.S.R. (2% $\text{MoO}_3$ )	U.S.A. vacuum resid (Gach Saran)

Table 3  
Target Test Conditions

For atmospheric resid:

Temperature = 400°C

Space Velocity = 1.0

Hydrogen partial pressure = 2000 psig (2050 psig total)

For vacuum resid:

Temperature = 422°C

Space Velocity = 0.75

Hydrogen partial pressure = 2000 psig (2050 psig total)

Test Equipment:

Each Country to use their respective equipment  
corresponding to approximately a 200 cc reactor  
volume of catalyst

Table 4  
Target Schedules

<u>Tasks</u>	<u>Type of Activity</u>	<u>Duration and/or Date</u>
1. Transfer of all necessary materials, shipping date		January 31, 1975, shipping date
2. Complete screening tests		1 month after actual item 1 date
3. Exchange information on screening tests		1/2 month after actual item 2 completion
4. Long term tests		After completion of item 3 initiate approximately 1 test per month. However, July 31, 1975, is a target completion
5. Complete and exchange draft report		1 month after actual completion of item 4
6. Meeting in the U.S.S.R. to discuss drafts, outline of final report and responsibilities in its preparation, and discuss additional tests		1 month after draft exchange of item 5
7. Prepare final drafts and exchange them		1 month after meeting of item 6
8. Meeting in U.S.A. to prepare co-authored final report and possible articles for publication		1 month after exchange of Final drafts
9. Conduct communications regarding additional work (demetallization, desulfurization or other tests).		Initiate during or after long term tests depending on test results.

Table 5

Samples and Analyses

I. For All Test Runs

1. Samples

- A. Feed material
- B. Demetallized product at 50 hours into test run
- C. Demetallized product at end of test run
- D. Used catalyst

2. Analyses on oils from 1 above

- A. Specific gravity
- B. Metal content (V and Ni)
- C. Sulfur analysis of liquid products,  $C_4^+$
- D. Sulfur analysis on vacuum distillation fraction

IP - 500°C

500°C

3. Analyses on used catalyst

- A. C %
- B. S %
- C. V ppm
- D. Ni ppm

II. Additional Analyses for Long Duration Tests

Bulk density, surface area, pore volume, and pore size distribution on used catalyst and on fresh catalyst

Table 6

U.S.A. Materials to be sent to the U.S.S.R.

I. Screening Tests

A. Supply for the runs

1. one drum (55 gallon) of Tia Juana vacuum resid
2. one-half drum of Gach Saran vacuum resid
3. one liter of promoted catalyst (1% Mo)

B. Obtained from the tests

1. 20 grams of used catalyst (USSR 2%  $\text{MoO}_3$ ) from screening tests
2. one-half liter of demetallized product at 50 hours
3. one-half liter of demetallized product at end of run

II. Long Duration Tests

A. Supply for the runs

1. three drums (55 gallons each) of U.S.A. vacuum resid (Tia Juana)
2. two liters of promoted catalyst (1% Mo)
3. one liter of unpromoted catalyst (0% Mo)
4. one-half drum of U.S.A. vacuum resid (Gach Saran)
5. one drum of U.S.A. vacuum resid (Tia Juana if available or as an alternate Bachaquero)

B. 1. 20 grams of used catalyst from each run

2. one-half liter of demetallized product at 50 hours
3. one-half drum of U.S.A. vacuum resid (Gach Saran)

Table 7

U.S.S.R. Materials to be sent to the U.S.A.

- A. Supply for all runs (total for screening and long duration)
  - 1. three drums (200 liters each) of USSR atmospheric resid
  - 2. three drums (200 liters each) of USSR vacuum resid
  - 3. two liters of USSR catalyst (2%  $\text{MoO}_3$ ) sized to 20X50 mesh.
- B. Obtained from the tests
  - 1. 20 grams of used catalyst from each run
  - 2. one-half liter of demetallized product at 50 hours for each run
  - 3. one-half liter of demetallized product at the end of each run.

Project B-7: Improvement of Equipment and Technology for Coal Enrichment

1. Background

In USSR and USA the flotation of coal is widely developed. However, the trends in development of equipment and technology in both countries have not been analogous. Research on the desulfurization of coal by flotation is also ongoing in both countries.

As a result, the flowsheets, equipment, the quality of the finished products, and methods of handling the flotation concentrates and tailings are different in the two countries.

2. Objective

Development of optimum methods for the design of equipment and improved technology of desulfurization of coal by flotation processes.

3. Scope of Work

The following tasks will be performed to achieve the above objectives.

Task I:

Exchange of detailed information on the following:

- a) Results of research on desulfurization of coal by flotation.
- b) Flowsheets, equipment, and quality and quantity indicators of the desulfurization of coal by flotation products including characteristics of raw coal, auxiliary equipment, flotation reagents and methods for handling flotation products.
- c) Results of research on optimization of flotation equipment.

The information and data to be exchanged will be transmitted in the form of concise written reports on flotation equipment design and technology of coal desulfurization by flotation.

Task II:

Experts from both countries will meet for evaluation of the information received and development of the program for further cooperation.

Task III:

Experts from both countries will meet to develop a methodology for joint studies and exchange samples of coal, flotation reagents, and technical schemes for desulfurization of coal by froth flotation.

4. Task I - July 1975

Task II - Third quarter of 1975 we will meet in the USSR

Task III - Fourth quarter of 1975 we will meet in the USA

B-10: Development of Common Methodology for Comparing the Economics  
of Various Processes for Hydrodesulfurization of Heavy Petroleum Stock

1. Background

Discussions were held at VNII NP to define specific opportunities for cooperation in the field of economic evaluation of approaches to sulfur oxide control which are not affected by the proprietary nature of information in the economics of petroleum refining in the U.S. Reports illustrating the general nature of work in respective countries were exchanged.

2. Objective

To develop methods for comparing SO<sub>2</sub> control process economics in the US and the USSR.

3. Scope of Work

Task I

Both sides will review materials supplied and consider possibilities for joint work. Both sides are to make a discussion and transmit the answer.

Task II

If cooperative possibilities are identified a meeting between experts from the US and the USSR will take place in the US. If agreement is reached experts will prepare a proposed project for consideration at the Working Group at its next meeting in the first quarter of 1975.

4. Schedule:

Task I - January 15, 1974

Task II - Prior to Working Group meeting, Moscow, April 1975.

B-11: Power generation plant with combined cycle based on gasification of coal and oil

1. Background

Oil and coal combined-cycle power generation systems are of interest to both the US and the USSR. The purification of the products of gasification and combustion is of major importance to both long-term operation of the power generation system and for environmental protection.

2. Objective

It is the objective of this effort to jointly select the best integrated gasification, clean up and combined-cycle power plant system and to prepare preliminary designs of these selected combinations which would form the basis for additional effort that could result in the design of a full scale plant.

3. Scope of Work

Task I

Information will be exchanged that would present the best power generation with combined cycle concepts in both countries. This information should be concise and conceptual in technical details and will include the following:

- Cycle configurations, coal/oil gasification, fuel gas clean up and power generation consisting of flow diagrams, operating parameters and material balances. Configurations will be identified as either base, intermediate or peak loading type operations.
- The basis and philosophy behind the design selection will be discussed
- Cost of the electrical and thermal energy will be presented and consideration will be given to, effects of variations in configuration and in plant capacity on the cost. Since the technology being

presented is conceptual and preliminary in nature the cost comparison should be made by indicating effects by percentage decrease or increase in the cost of electrical and thermal energy instead of absolute values.

- To provide for a basis of comparison both sides will present a cost analysis of a conventional coal/oil fired power plant. This plant should include emission control and consist of five (5), 500 megawatts steam power units ( $540^{\circ}\text{C}$ , 160 atm).
- A concise the-state-of-art of the integrated combined cycle power generation technology in both countries will be prepared. Included will be a list of all combined cycle installations.

#### Task II

One month after the exchange of information described in Task I has been completed, a meeting will be held to discuss the exchanged information. The proceeding discussions and results of this meeting will be presented in a report jointly prepared by both sides and will be published in both countries.

#### Task III

Based on the results, information and program defined in Task II, on the best conceptual designs of an integrated oil and coal gasification, clean up and combined cycle power plants, both sides will conduct engineering studies of those selected (1 or 2 configurations by each side). The studies would address the technology, economics and operating conditions to a level that would be a basis for an engineering design of a commercial operations. The results of these studies will be exchanged by both sides.

Task IV

One month after the exchanged material has been received, both sides will meet to discuss and review the information. The result of the engineering evaluation (Task IV) will be used to identify the best one or two designs for a commercial integrated coal and oil gasification, clean up and combined cycle power plant. During this meeting, further cooperative effort and programs will be determined. The results of this meeting will be jointly written summarizing the results and recommendations of the group and included in the results from Task I through Task IV.

The results of the parametric studies will be used to identify the best one or two conceptual designs for integrated oil gasification, clean up and combined-cycle power plants and the best one or two conceptual designs for integrated coal gasification, clean up and combined cycle plants which would be used as the basis for study for future cooperation.

The report will define future work which would fulfill the intent of this project which is to result in the best design of a commercial plant. At that time, the working group will define the future program.

3. Schedule

Experts from the US and USSR will meet in the U. S. prior to the third working group meeting. If the project is finalized and approved by the working group, the following tentative schedule is projected:

Task I - 4 months

Task II - 6 months

Task III - 12 months

Task IV - 14 months

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Both sides feel that Task I and Task II could be completed in the first half of 1975, since this work is already being conducted. Additionally, the development of the joint reports will be done concurrently with the studies.

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B-12: Gas Cleaning Systems for Coal and Oil Gasification Systems

Gas Cleaning Systems for the Coal and the Oil Gasification used in Power Generation Plants.

1. Background

Both the US and the USSR are developing gas cleaning - desulfurization and particle removal - systems adapted to use in fuel gasification for power generation plants. These systems produce a clean gaseous fuel either for a steam boiler or for a gas turbine combustor. Various processes produce the fuel gas at temperatures from 500 °C (900°F) to 1500°C (2700°F) and at pressures from 1 atm to 30 atm. Similarly, various gas cleaning processes operate at temperatures from 60°C (150°F) to 1000°C (1800°F) and at pressures from 1 atm to 30 atm. If a low temperature cleaning system is employed, a means for cooling the fuel gas is required; means for recovering its thermal energy may also be required. Practical low temperature gas cleaning systems are based on scrubbing with aqueous solutions. High temperature desulfurization based on solid sorbents - limestone/dolomite, iron oxide, manganese oxide, etc. - and departiculization based on cyclones and granular filters have been studied in both the US and the USSR.

2. Objectives

The objective of the work is to identify the most promising gas cleaning systems for fuel gasification power generation plants and to recommend a program which will complete the development and first full scale operation of such systems.

3. Scope of Work

Task I

Data to be used in the work will be assembled by responsible organizations in the US and the USSR. Information exchanged describing the systems -- flow diagrams operating conditions, material and energy balances, performance, and the state of development. The advantages and disadvantages of each system will be discussed. Data would also address the relative economics of each concept.

Task II

One month after exchanged material has been received, a meeting will be held to discuss the exchanged material. All material must be received from both sides one month prior to the meeting.

Task III

Selection of preferred or best gas cleaning systems - one for operation at low temperature and one for operation at high temperature will be made by the US and by the USSR. These selections will be made based on estimates of performance and economics. The data and methods for evaluating the systems will be shared, unless previously established proprietary rights prevent such sharing. Both the technology and philosophy of the evaluation process will be discussed.

Task IV

The results of the work will be presented in a joint final report. This document will not only summarize work accomplished results achieved, and conclusions, reached, it will recommend further studies, laboratory work, pilot plant investigations and demonstration efforts to achieve successful cleaning systems for fuel gasification power plants.

At the meeting, based on the best high and low temperature cleaning systems as chosen by each side, the technology, engineering design, economics, measurement technique and status of work will be discussed. Based on the discussions, recommendations will be made as to further project work.

4. Schedule

If project is finalized and approved by the Working Group the following schedule is projected.

Task I - 2nd Q 75

Task II - 4th Q 75

Task III - 2nd Q 76

Task IV - 4th Q 76

## Power Systems

### 1. Background

At the present time utility application of coal and oil gasification for power generation plants are being considered by investigators in the US and USSR. These plants are now being designed without the aid of mutual cooperation of both countries. Review by the other country of the various design stages (preliminary, engineering, and detailed design), plant operation, and data evaluation will permit mutual assistance to achieve best possible operation of utility gasification combined cycle plants to the benefit of both the US and USSR. Common problems can be identified and recommendations given for their solution.

### 2. Objective

To identify specific programs where mutual collaboration in demonstration projects is desirable.

### 3. Scope of Work

Task I - Both sides will review demonstration work in their respective countries and identify candidate projects for inclusion in the recommended program. The candidate sites will be identified as to their size, location, economics, configuration and stage of development.

Task II - A meeting between experts will be held to consider candidate processes and select in each country those which will be included in a project to study. At the meeting, a program will be finalized to identify data to be exchanged, schedule for plant visits and future program of the study. The plant visits by experts of both sides will be completed prior to Task III.

Task III - Review of preliminary, engineering and detail, designs, by the other countries' experts, of plants which are selected for the program, would follow approval of a project. The review would make suggestions as to:

- A) possible modification to be made before, or during construction and
- B) identification of possible problem areas that should be closely observed by the operators.

Task IV - Skilled observers will be sent to the operating plants to observe them in operation and to make comments to the operating country concerning possible improvements in operation.

Task V - The operating data will be received, analyzed and suggestions with regard to operation will be made. Such suggestions can be in the form of recommendations for modification of operation, modification, of plant configuration or for improvement in design of future plants.

#### Schedule

Task I - 1st Quarter of 1975

Task II - 2nd Quarter of 1975

Plant visits - 3rd - 4th Quarter of 1975

B-5: Gasification of Coal and Oil and Changing of Fuel Gas for Power Generation

1. Background

Consideration has been given to cooperation in research relating to five areas: a) gasification of coal to produce high calorific gas, b) gasification to produce low BTU gas, c) combined cycles and generation of clean energy, d) clean-up systems for gases from gasification and e) pollutant identification in fossil fuels and coal/oil conversion processes.

2. Objective

To continue exploration of cooperative opportunities in all areas. Areas b) c) and d) above are further defined for future reference in projects B-11, B-12, B-13. Areas a) and e) are to be the subject of continued investigation of cooperative opportunities.

3. Scope of Work

During 1975 a meeting will be held with experts and representatives from the Energy and Environmental working groups that involved with this technology. The discussions will present the status of on going efforts in both countries and direction of future activities. Prior to the meeting, concise descriptive report(s) will be exchanged. After reviewing this work at the meeting, both sides will determine areas of cooperation and programs for the cooperation.

B-6: Production of Liquid Fuels from Coal and Mixtures of Coal and Oil

1. Background

Both sides have active programs for production of liquid fuel from coal and oil and cooperative research is of interest. Review of work in the two countries is not yet complete.

2. Objective

To continue efforts to define appropriate projects for joint research.

3. Scope of Work

During 1975 a meeting will be held with experts and representatives from the Energy and Environmental working groups that are involved with this technology. The discussions will present the status of on going efforts in both countries and direction of future activities. Prior to the meeting, concise descriptive report(s) will be exchanged. After reviewing this work at the meeting, both sides will determine areas of cooperation and programs for the cooperation.